BLUMEA 30 (1984) 157–167

# FLORAE MALESIANAE PRAECURSORES LXIV
# APOCYNACEAE VI. RAUVOLFIA

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SUMMARY

Treatment of the 9 Malesian species of *Rauvolfia* L. (Apocynaceae), of which one newly described, *R. moluccana*. A key to the Malesian species is given.

## RAUVOLFIA

*Rauvolfia* L., Sp. Pl. (1753) 208; Gen. Pl. ed. 5 (1754) 98; DC., Prod. 8 (1844) 336; Benth. & Hook. f., Gen. Pl. 2 (1876) 637; Hook. f., Fl. Br. India 3 (1882) 632; K. Schum. in E. & P., Nat. Pfl. Fam. 4, 2 (1895) 153; Boerl., Handl. 2 (1899) 357, 393; King & Gamble, Mat. Fl. Mal. Pen. 19 (1907) 424; Merr., En. Born. (1921) 499; En. Philip. Fl. Pl. 3 (1923) 329; Ridley, Fl. Mal. Pen. 2 (1923) 335; Markgr., Nova Guinea 14 (1928) 283; Bot. Jahrb. 61 (1928) 188; Kerr in Craib, Fl. Siam. En. 2, 5 (1939) 428; Pichon, Bull. Soc. Bot. Fr. 94 (1947) 26; Mém. Mus. Hist. Nat. Paris n.s. 27 (1948) 162; Bakh. f., Blumea 6 (1950) 386; Backer & Bakh. f., Fl. Java 2 (1965) 231. – *Ophioxylon* L., Sp. Pl. (1753) 1043; Miq., Fl. Ind. Bat. 2 (1856) 403. – *Dissolena* Lour., Fl. Cochinch. (1790) 137. – *Cyrtosiphonia* Miq., Fl. Ind. Bat. 2 (1856) 401.

Laticiferous trees, treelets, shrubs, or subshrubs. *Leaves* (2-) to 3- to 5-whorled, simple, entire, with axillary glands on the petiole; the uppermost 2 or 3 nodes often condensed, in some species forming the whole shoot of a branch. *Inflorescences* aside of the leaves (therefore usually explained as terminal and thrown aside by a vegetative shoot), arranged in an apical whorl in several species; the single partial inflorescence 1- to 2-noded with di- or trichasial branches. *Flowers* small. *Calyx* lobes short, without glands inside. *Corolla* white or pink, rarely with a red tube, salver-shaped with spreading lobes, the mouth closed by a ring of hairs. Corolla tube either long-cylindric and staminiferous about the middle, or short-cylindric and staminiferous at the slightly widened mouth. Corolla lobes contorted to the left. *Anthers* ovate, short. *Stigma* head reaching the anthers, drum-shaped with a pendulous ring, shortly apiculate. *Disc* cup-shaped. *Carpels* 2, separate or more or less connate, each one biovulate. *Fruit* drupaceous, apocarpous or variously syncarpous, consisting either of 2 ellipsoidal drupes, or of one V-shaped or cordate or globose drupe; sometimes only one carpel developed. Carpels usually 1-seeded. *Seeds* with carnose albumen. *Embryo* with flat, elliptic or oblong cotyledons.

Distribution. *Rauvolfia* is usually kept as pantropical, comprising about 80 species, of which 34 in America (see Rao, Ann. Missouri Bot. Gard. 43, 1956, 253–354), about 30 in Africa, about 30 in Asia, of which 9 in Malesia.

Type species. *Rauvolfia tetraphylla* L., an American species, cultivated also in tropical Asia.

General review. Woodson et al., *Rauvolfia*. Botany, Pharmacognosy, Chemistry, Pharmacology. Boston, 1957.

Note. The syncarpous fruit of the *R. sumatrana* group (species 5–9) may develop in two different manners. The ovary, consisting of two separate locules, afterwards forms a common, fleshy mesocarp and two hard endocarp portions. In some species this fleshy mesocarp remains thin and envelops tightly the endocarp without penetrating between its two portions. These remain contiguous at their base and spread obliquely by their tips. Therefore the outline of the fruit becomes inversely trapezoid (broadly V-shaped) or obcordate (fig. 1b). In other species the mesocarp grows thick and penetrates between the two endocarp portions. These get free from each other and become directed upward. The outline of such a fruit resembles a cherry with a flat deepening on the top (fig. 1a). These differences may be observed already in young fruits and do not depend on their age.

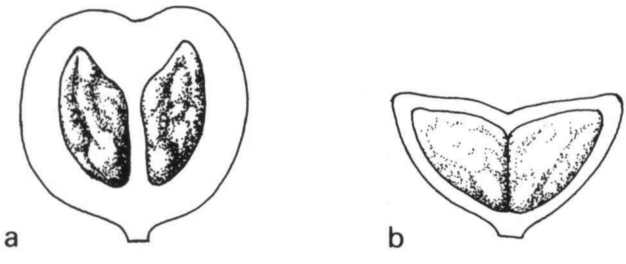



Fig. 1. Longitudinal section of two fruits of *Rauvolfia* (endocarp not opened, mesocarp white) a. *R. sumatrana* Jack; b. *R. javanica* Koord. & Valeton.

## KEY TO THE MALESIAN SPECIES

1a. Corolla tube 10–16 mm long, staminiferous in 1/2–2/3. Fruit subcordate, its two halves free, ellipsoidal, moderately fleshy, not always both carpels developed. Leaves chartaceous . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 2

b. Corolla tube 2–5 mm long, staminiferous below the mouth. Fruit united into a globose or obversely trapezoid drupe. Leaves subcoriaceous (chartaceous in *R. rostrata*) . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 3

2a. Treelet or shrub 2–3 m. Leaves elliptic, acuminate, about 15 by 3 cm, veins usually 7–8 mm spaced. Inflorescence loose, peduncle 0.5–3 cm. Fruit subacuminate, 10–13 mm kong, 7 by 4 mm broad and thick. *Usually* only one carpel developed . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **1. R. verticillata**

b. Herb or subshrub, not higher than 1 m. Leaves broad-elliptic, acuminate, 14–24 by 4–7 cm, veins 10–15 mm spaced. Inflorescence crowded, peduncle (4–)6–10 cm. Fruit obtuse, 8 by 5 by 4 mm, *sometimes* only one carpel developed **2. R. serpentina**

3a. Inflorescences 1–3(–5) below or at the top of leafy twigs, slender, repeatedly di- or trichasial, 4–6 cm long. Calyx lobes ovate or triangular. Corolla tube 2 mm long . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 4

b. Inflorescences whorled at the top of leafy twigs, stout, the single one thyrsoid with 1–2 nodes bearing di- or trichasia, (5–)8–18 cm long. Calyx lobes suborbicular, often broader than long. Corolla tube (3–)4–5 mm long (*R. sumatrana* group) . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 5

4a. Leaves membranous to subcoriaceous, lanceolate, not tailed. Calyx lobes ovate. Fruit nearly obreniform, its carpels subglobose, 9 mm diameter **3. R. amsoniifolia**

b. Leaves chartaceous, oblong-elliptic, tailed. Calyx lobes obtusely triangular. Fruit obversely trapezoid, its tips spreading to 14–18 mm . . . . . . . . . **4. R. rostrata**

5a. Fruit obversely trapezoid, spreading, with thin mesocarp, the parts of the endocarp horizontal, contiguous by their bases. Leaf veins 5–8 mm spaced . . . . . 6

b. Fruit globose, with thick mesocarp, this entering between the endocarp-halves, these erect, free from each other . . . . . . . . . . . . . . . . . . . . . . . . . . . 7

6a. Leaves 4- to 5-whorled, broad-elliptic, 10–35 by 4–8 cm. Disc lower than half the ovary. Fruit up to 9 mm long, 1.5 mm broad, the tips spreading by 30° **5. R. moluccana**

b. Leaves 3- to 4-whorled, lanceolate, 14–30 by 3.5–6.5 cm. Disc higher than half the ovary. Fruit 7 mm high, 12 mm broad, the tips spreading by 45° **6. R. javanica**

7a. Treelet up to 15 m. Leaves 3- to 4-whorled, obovate-elliptic, (6–)9–21 by 3.5–6.5 cm. Corolla tube 4 mm long, lobes 1.2–1.3 mm long, 1.4–1.6 mm broad (broader than long). Disc higher than half the ovary. Fruit with moderately thick mesocarp, about 13 mm diameter, with broad base . . . . . . . **7. R. reflexa**

b. Trees up to 20 m. Leaves (3-), 4- to 5-whorled, elliptic to elliptic-obovate. Corolla tube 4–4.5 mm long, lobes 1.2–1.7 mm long, 1.6–2 mm broad (broader than long). Disc lower than half the ovary. Fruit with conspicuously thick mesocarp, often constricted into a cylindric base 1–2 mm high and 1 mm broad . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 8

8a. Leaves 4- or 5-whorled, broad-elliptic, (12–)20–33 by 4–8 cm. Fruit 15 mm diameter . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **8. R. samarensis**

b. Leaves 3- to 5-whorled, elliptic-obovate, (7–)15–26 by 3–5 cm. Fruit slightly depressed above, 15–18 mm high, 18–24 mm wide . . . . . . . . **9. R. sumatrana**

## 1. Rauvolfia verticillata (Lour.) Baillon

*R. verticillata* (Lour.) Baillon, Bull. Soc. Linn. Paris 1 (1888) 768, non Chev., 1913; Tsiang, Sunyatsenia 2 (1934) 109; Merr., Trans. Am. Phil. Soc. n.s. 24 (1935) 312; Pichon, Bull. Soc. Bot. Fr. 94 (1947) 33; Monach., Econ. Bot. 8 (1954) 358; Chakrav., Bull. Bot. Soc. Beng. 9 (1955) 7; Tsiang Ying & Lan Shi Lun, Guangdong Linxueyuan Yanjiu Baogao (= Report Stud. Bot. Inst. Kwangtung) 1 (1962) 14–16, tab. 9–12; Hui Lin Li, Woody Fl. Taiwan (1963) 790, f. 318; Tsiang Ying & Li Ping Tao, Acta Phytotax. Sin. 11 (1973) 347; Fl. Reip. Pop. Sin. 63 (1977) 55–57, tab. 19; Whitm., Tree Fl. Mal. 2 (1973) 21; Hui Lin Li, Fl. Taiwan 4 (1978) 215, tab. 973. – *Dissolena verticillata* Lour., Fl. Cochinch. (1790) 137. – Type: *Loureiro s.n.* (BM), Canton.

*R. densiflora* (Wallich) Benth. in Benth. & Hook. f., Gen. Pl. 2 (1876) 697, non Warb., 1919; Benth. ex Hook. f., Fl. Br. India 3 (1882) 633; K. Schum. in E. & P., Nat. Pfl. Fam. 4, 2 (1895 (1895) 153; Ridley, J. Str. Br. R. As. Soc. 59 (1911) 129; Valeton, Ic. Bog. 4 (1913) 207–210, tab. 367; Kerr in Craib, Fl. Siam. En. 2, 5 (1939) 429; Pichon, Bull. Soc. Bot. Fr. 94 (1947) 33; Monach., Econ. Bot. 8 (1954) 358; Huber, Rev. Handb. Fl. Ceylon 1 (1973) 15. – *R. chinansis* (Sprengel) Hemsley, J. Linn. Soc. Bot. 26 (1889) 95; Pitard, Fl. Gén. I.-C. 3 (1933) 1116; Tsiang Ying & Li Ping Tao, Fl. Reip. Pop. Sin. 63 (1977) 55. – *R. maior* (Hassk.) Nicholson, Dict. Gard. 3 (1886) 279; Boerl., Handl. 2 (1899) 393; Pichon, Bull. Soc. Bot. Fr. 94 (1947) 33. – *R. serpentina* Ridley, Trans. Linn. Soc. Bot. II, 3 (1893) 319. – *R. serpentina* var. *gracilis* Stapf, Trans. Linn. Soc. Bot. II, 4 (1894) 207 (= *R. verticillata* var. *gracilis* Monach. in sched.); Merr., En. Born. (1921) 499. – *R. obversa* Koord., Nat. Tijd. Ned. Ind. 60 (1900) 243, non Baillon. – *R. perakensis* King & Gamble, Mat. Fl. Mal. Pen. 19 (1907) 424; Ridley, J. Str. Br. R. As. Soc. 59 (1911) 129; Fl. Mal. Pen. 2 (1923) 335; Burkill & Hend., Gard. Bull. Str. Settl. 3 (1925) 396; Bartlett, Pap. Mich. Acad. 6 (1926) 58: Hend., Gard. Bull. Str. Settl. 4 (1927) 99; J. Mal. Br. R. As. Soc. 17 (1939) 57; Mal. Wild Fl. 1 (1959) 283, f. 266; Kerr in Craib, Fl. Siam. En. 2, 5 (1939) 430; Corner, Wayside Trees (1940) 148; Pichon, Bull. Soc. Bot. Fr. 94 (1947) 33; Monach., Econ. Bot. 8 (1957) 358; Tsiang Ying & Lan Shi Lun, Guangdong Linxueyuan Yanjiu Baogao (= Report Stud. Bot. Inst. Kwangtung) 1 (1962) 8, tab. 3; Kiang, Lee & Goh, Lloydia 27 (1964) 220; Burkill, Dict. ed. 2 (1966) 1918; Tsiang Ying & Li Ping Tao, Fl. Reip. Pop. Sin. 63 (1977) 53. – *R. membranacea* Merr., Philip. J. Sc. 14 (1919) 449; En. Philip. Fl. Pl. 3 (1923) 329; Pichon, Bull. Soc. Bot. Fr. 94 (1947) 37. – *R. loheri* Merr., Philip. J. Sc. 27 (1925) 50; Pichon, Bull. Soc. Bot. Fr. 94 (1947) 33; Monach., Econ. Bot. 8 (1954) 358. – *Cerbera chinensis* Sprengel, Syst. 1 (1825) 642. – *Tabernaemontana densiflora* Wallich, Bot. Reg. (1829) tab. 1273. – *Ophioxylon maius* Hassk., Flora 28 (1845) 263bis (= 295); Miq., Fl. Ind. Bat. 2 (1856) 404. – *Hunteria sundana* Miq., Fl. Ind. Bat. 2 (1856) 409; K. Schum. in E. & P., Nat. Pfl. Fam. 4, 2 (1895) 151; Boerl., Handl. 2 (1899) 393. – *Ophioxylon densiflorum* Thw., En. Pl. Zeyl. (1860) 191. – *Ophioxylon chinanse* Hance, J. Bot. 3 (1865) 380.

Shrub 2–3 m. *Leaves* 2- to 3-whorled, petiole with rather long (1 mm) pectinate axillary glands, blade elliptic, conspicuously acuminate at both ends, membranous, (8–)10–20 by (2–)4–6 cm (usually 15 by 5 cm), veins arcuate, about 1 cm spaced, 7–10 pairs. *Inflorescences* never solitary, loose, repeatedly trichasial, peduncle (3–) 5–9 cm, bracts remote, lanceolate, 1 mm long, pedicels 3–6 mm long. *Calyx* lobes lanceolate, 2–3 by 1 mm. *Corolla* pinkish white, tube 10–12 by 1 mm, inflated at 1/2–2/3, pilose inside from middle to mouth, lobes broad-elliptic, obtuse, 4 by 2 mm. *Anthers* inserted in the inflated part, oblong-ovate, acute, 1.6 by 0.4 mm, incrassate at the back. *Ovary* ovate, 0.7 mm high, carpels quite separate. Disc cup-shaped, 0.3 mm high. *Drupe* apocarpous, usually only one carpel developed, elliptic,

subacuminate, 10–13 by 7 by 4 mm. *Seed* acuminate at both ends, 10 by 4 by 2 mm, cotyledons elliptic, obtuse, 1.8 by 1 mm, radicle 2 by 0.5 mm.

Distribution. From Sri Lanka through India, Burma, Thailand, Indochina, Hainan, South China, Taiwan, Hongkong; in Malesia in the Malay Peninsula, Sumatra, Java, Lombok, Borneo, N. Philippines (Luzon).

MALAY PENINSULA. Kedah: Ridley 14940. – Kelantan: Ridley s.n.; Yapp 30. – Pahang: Ridley 1166. – Perak: Ridley 14272. – Selangor: Kloss s.n., Robinson s.n.

SUMATRA. East: Bartlett 8540; Bartlett & La Rue 94, 193, 393; Lörzing 4631, 13708, 14556. – Central: Bartlett 10413, (& Rahmat si Boeea) 10871. – West: Meijer 5640a, 5642.

JAVA. Backer 37081, 37098; Beumée 1533; Buwalda 7245; Coert 1422; Dilmy et al. 8; Dorgelo 1360, 3086; Jacobs 4877; Junghuhn s.n.; Kobus 21, 26, 27; Koorders 23498, 27645, 29156, 38017, 38018, 38156, 42534, 43178, 43262; van Steenis 11032; Zollinger 2153. – Hort. Bogor. XV-J-A-XX-5 (Bisset & Darlang).

LESSER SUNDA ISLANDS. Lombok: Elbert 943, 1014, 1538, 1723, 2444.

BORNEO. Sabah: Chew et al. 1239; Clemens 28200, 30328, 30768, Ding Hou 285; Fuchs et al. 21108; Haviland 1346; Kokawa 6214; Kokawa & Hotta 4081, 4383, 4542, 5702; RSNB 619, 1277, 4018, 4342, 4565; SAN A 1659, A 4415, 22445, 27672, 32332.

PHILIPPINES. Luzon: BS 33214, type of *R. membranacea* Merr.; Loher 12500, type of *R. loheri* Merr.

Ecology. Lowland and montane rain forests, monsoon forest, not uncommon in open places such as riverbanks, villages, rice fields, sea shores, also on limestone and bare lava rocks; up to 1650 m. Var. *gracilis* (Stapf) Monach. seems an ecotype of reduced habit in cooler montane conditions on Mt Kinabalu (Borneo).

Uses. In China against snake poison, malaria, typhus etc. (Tsiang Ying).

## 2. Rauvolfia serpentina (L.) Benth.

*R. serpentina* (L.) Benth. ex Kurz, For. Fl. Br. Burma 2 (1877) 171; Hook. f., Fl. Br. India 3 (1882) 632; Boerl., Handl. 2 (1899) 393; Koord., Exk. Fl. Java 3 (1912) 74; Koord.-Schum., Syst. Verz. (1912) 175; Merr., Int. Rumph. (1917) 430, En. Born. (1921) 499; Heyne, Nutt. Pl. Ned. Ind. ed. 2 (1927) 1286; Backer, Onkr. Suikerr. (1934) 499; Kerr in Craib, Fl. Siam. En. 2 (1939) 430; Kanjilal, Fl. Assam 3 (1939) 251; Pichon, Bull. Soc. Bot. Fr. 94 (1947) 33; Bakh. f., Blumea 6 (1950) 386; Meijer Drees, Comm. 33 For. Res. Inst. Bogor (1951) 36; Monach., Econ. Bot. 8 (1954) 349; Chakrav., Bull. Soc. Bot. Beng. 9 (1955) 3; Pham Hoang Ho, J. Agr. Trop. Bot. Appl. 5 (1958) 177; Sigaldy, l.c. 179, Tsiang Ying & Lan Shi Lun, Guangdon Linxueyuan Yanjiu Baogao (= Report Stud. Bot. Inst. Kwangtung) 1 (1962) 8, tab. 2; Wakhloo, J. Ind. Bot. Soc. 43 (1964) 96; Backer & Bakh. f., Fl. Java 2 (1965) 231; Huber, Rev. Handb. Fl. Ceylon 1 (1973) 5; Tsiang Ying & Li Ping Tao, Fl. Reip. Pop. Sin. 63 (1977) 49–51. – *Ophioxylon serpentinum* L., Sp. Pl. (1753) 1043; Horsf., Verh. Bat. Gen. K. & W. 8 (1816) 98; DC., Prod. 8 (1844) 342, Hassk., Flora 28 (1845) 263bis (= 295); Miq., Fl. Ind. Bat. 2 (1856) 404. – Neotype (proposed by Monachino): *Hermann s.n.* (BM), Ceylon.

*Ophioxylon obversum* Miq., Fl. Ind. Bat. 2 (1856) 405. – *R. obversa* Baillon, Hist. Pl. 10 (1891) 171, in adnot. – *R. serpentina* var. *observa* (Miq.) Bakh. f., Blumea 6 (1950) 386 (sphalm.). – *R. trifoliata* (Miq.) Baillon, Hist. Pl. 10 (1891) 171, in adnot. – *Ophioxylon trifoliatum* Gaertn., Fruct. 2 (1791) 129, tab. 109. – *Radix mustelae* Rumph., Herb. Amb. 7 (Auctuarium) (1755) 29, 30, tab. 16.

Monograph of the species: Monachino, Econ. Bot. 8 (1954) 349–365.

Erect subshrub 20–60(–100) cm, glabrous. Root usually unbranched, 20–40 by 1–2 cm, rimose, gibbous, bitter. Stem usually unbranched, slender. *Leaves* condensed near the top of stem, (2–)3(–5)-whorled, petiole 5–15 mm, blade membranous, oblanceolate or obovate, 7–16 by 3–9 cm, acuminate, rarely obtuse, base cuneate, veins arcuate, widely spaced, 7–15 pairs. *Inflorescence* often solitary, cymose, crowded, peduncle 5–9(–13) cm, bracts and pedicels minute. *Calyx* lobes lanceolate, 1.3–3 mm, often with 1 or 2 minute teeth. *Corolla* pink or white, tube 11–16 by 1.2 mm, inflated slightly above the middle, inside pilous from middle to mouth, lobes obliquely suborbicular, 1.5–3.5 mm, obtuse, glabrous. *Stamens* inserted in the inflated part of the tube, anthers short-ovate with incurved tip, 1.1–1.4 by 0.4 mm, incrassate at the back. *Ovary* ovate, rounded, 1.2 mm high, its carpels shortly united at the base. Disc cylindric, undulated, 0.5–0.8 mm high. *Drupe* hemisyncarpous (but sometimes only one ellipsoidal carpel developed), cordate, obtuse, purple-black, 8 by 4 mm. *Seed* one in either carpel, oval, about 6 by 3 by 3 mm. Embryo straight, cotyledons broad-ovate, 2 by 1.8 mm, radicle 2 by 1 mm.

Distribution. From Sri Lanka through India (with Andaman Islands) to Thailand, Indochina and S. Yunnan; in Malesia: northern Malay Peninsula, (not seen from Sumatra), Java, Flores, Timor. Cultivated in India, Java, Ambon, and S. China.

JAVA. Backer 8293, 36503, 37242; Horsfield s.n., type of *Ophioxylon obversum* Miq.; Junghuhn 120, 136; Teijsmann 1610.

LESSER SUNDA ISLANDS. Flores: Verheijen 956, 957; Schmutz 386, 1885. – Timor: Kooy 53, 774.

Ecology. Low subshrub, open or shaded, in well-drained rain forest and in secondary thickets (in Java up to 2100 m). Also as a weed in sugarcane fields (Backer). Sensitive to bush fire. Flowering April–July, fruiting July–September, sparsely the whole year. Fruits dispersed by rain, not by birds. Germination immediate at 10–25% of soil moisture and 25–30°C, epigean out of the clasping endocarp.

Vernacular name. Puleh pantak (Java).

Uses. Known since ancient times against snake and scorpion poison. Rumphius had been told that the snake-eating mungo if beaten recovers by feeding on this plant. In modern pharmacy the root is used against hypertension and as a sedativum. The effective alcaloid is reserpine, discovered by Müller, Schlittler & Bein (Experientia 8, 1952, 338); moreover other alcaloids. In India the drug is sold since long, sometimes adulterated by *R. tetraphylla* L. (= *R. canescens* L.), a species of tropical America widely naturalized in tropical Asia (see Monachino).

### 3. Rauvolfia amsoniifolia DC.

*R. amsoniifolia* DC., Prod. 8 (1844) 338; Hemsley, Bot. Chall. Exp. 3 (1885) 163; Warb., Bot. Jahrb. 13 (1891) 404; K. Schum. in E. & P., Nat. Pfl. Fam. 4, 2 (1895) 154; Boerl., Handl. 2 (1899) 393; Merr., For. Bur. Bull. 1 (1903) 49; En. Philip. Fl. Pl. 3 (1923) 329; Heyne, Nutt. Pl. Ned. Ind. ed. 2 (1927) 1285; Pichon, Bull. Soc. Bot. Fr. 94 (1947) 37; Quis., Med. Pl. Philip. (1951) 736. – *Cyrtosiphonia amsoniifolia* (DC.) Miq., Fl. Ind. Bat. 2 (1856) 402. – Type: *Cuming 1249* (G), Luzon, Cagayan Prov.

Distribution. Malesia: S. Celebes, Salayer Islands, Timor, Tanimbar Islands, Kai Islands, Philippines.

S. CELEBES. Bonthain: Cel. I-65. – Salayer Islands: Teijsmann 13882; Zollinger 3322.
LESSER SUNDA ISLANDS. Timor: Teijsmann 8803, de Voogd 2314.
TANIMBAR ISLANDS (= TIMOR LAUT). bb 24262, van Borssum Waalkes 3115, 3119; Pleyte 5.
KAI ISLANDS. Beccari FI 6398; Jaheri 19; Jensen 184; Warburg 21335.
PHILIPPINES. Masbate: FB 12665. – Mindoro: PNH 13755, 16791, 22482. – Marinduque: Com. Fl. For. Filip. 1611. – Luzon: BS 7415; Cuming 1133, 1249; PNH 37497. – Not in Mindanao (Escritor 21387 = *R. sumatrana* Jack).

Ecology. Lowland rain forest and secondary thickets.
Uses. Young buds against stomach disorders with babies.

## 4. Rauvolfia rostrata Markgr.

*R. rostrata* Markgr., Bot. Jahrb. 61 (1928) 188; Kaneh. & Hatus., Bot. Mag. Tokyo 55 (1941) 504; Pichon, Bull. Soc. Bot. Fr. 94 (1947) 37. – Type: *Beccari 392* (FI), NW. New Guinea, Ramoi.
*R. amsoniifolia* auct. non DC.: Markgr., Bot. Jahrb. 61 (1928) 188.

Shrub or treelet about 1.50 m. Branches terete, smooth. *Leaves* 3- to 4-whorled, chartaceous, glabrous, oblong-elliptic, tailed, with cuneate base, 5–15 by 1.5–4 cm (usually 10 by 2.5 cm); veins nearly horizontal, 2–4 mm spaced; petiole 3–7 mm, with axillary glands 1 mm long when young. *Inflorescence* slender, loose, few-flowered, di- or trichasial, often ending in monochasia; peduncle 2–3 cm. *Calyx* lobes obtusely triangular, glabrous, 1.3 by 1.3 mm. *Corolla* white, tube 3 mm long, lobes ovate, 1.2 mm long, 1.4 mm broad. *Anthers* 7 mm long. Disc undulate, 3 mm high. *Ovary* 6 mm high. *Fruit* obversely trapezoid, 6–9 mm high, the tips diverging by 14–18 mm, about 5 mm thick. Cotyledons of the embryo oblong, obtuse, 2 by 0.8 mm, radicle 1.5 mm long.
Distribution. Malesia: Moluccas (Seram), West New Guinea.

MOLUCCAS. Seram: Rutten (Kornassi) 488, 1894, 2226a.
NEW GUINEA. Northwest: Beccari 392; Ijiri & Niimura 345, 659; Kanehira & Hatusima 11544, 11572, 11768, 12895; Pleyte 660; Satake & Niimura 709, 714. – Southwest: Pulle 468.

Ecology. Rain forest, *Agathis* forest, 0–500 m.

## 5. Rauvolfia moluccana Markgr., *nov. spec.*

Arbuscula 6–15 m alta. *Folia* 3- ad 4-verticillata, coriacea, late elliptica vel obovata, 10–24 × 4–8 cm; venae laterales 6–10 mm inter se distantes; petiolus 2–4 cm. *Inflorescentiae* versus apicem ramorum distributae, totus verticillus 10–12 cm altus et latus; singulae inflorescentiae partiales uni- vel binodes, ramulis di- vel trichasialibus, pedunculus 4–5 cm. *Calycis* lobi suborbiculares, 1.4 mm diam. *Corollae* albae tubus 4 mm longus, lobi 1.5 mm longi, 1.7 mm lati. *Antherae* 1.7 mm longae. *Ova-*

*rium* 1.2 mm altum, disco 0.4 mm alto cinctum. *Fructus* niger, cordiformis, 15 × 9 × 5 mm, mesocarpio tenui indutus, endocarpio in medio fructu contiguo totaliter explatus. *Semina* 7 × 4 × 4 mm. – Typus: *NGF 21949*, New Britain, Kandrian District, Pirilongi village.

Distribution. Malesia: Moluccas, NW. New Guinea, New Britain.

MOLUCCAS. Sula I.: Bloembergen 4406. – Seram: Rutten 1362. – Ambon: Jaheri 523b.
NEW GUINEA. Manokwari: Kostermans 354.
NEW BRITAIN. LAE 51151; NGF 10846, 21949.

Ecology. Rain forest, to c. 800 m altitude.

## 6. Rauvolfia javanica Koord. & Valeton

*R. javanica* Koord. & Valeton, Bijdr. 1 (1894) 191; Koord., Meded. Lands Pl. Tuin 11 (1894) 81; Exk. Fl. Java 3 (1912) 74; Fl. Tjibodas 3, 3 (1923) 57; Boerl., Handl. 2 (1899) 393; Koord.-Schum., Syst. Verz. 1 (1912) 174; Rendle, J. Bot. 63 (1925) Suppl. 67; Heyne, Nutt. Pl. Ned. Ind. ed. 2 (1927) 1285; Pichon, Bull. Soc. Bot. Fr. 94 (1947) 37; Backer & Bakh. f., Fl. Java 2 (1965) 231. – Type: *Koorders 151* (fl.), *152* (fr.), Java, Gede.

Tree up to 22 m. *Leaves* 3- to 4-whorled, lanceolate with often long-cuneate base, the uppermost ones 14–16 by 3.5–4 cm, the lower ones up to 30 by 6.5 cm, veins 2–4 mm spaced, petiole 0.5–1 cm. Single *inflorescence* with 1 or 2 nodes of trichasia, the whole whorl 11 cm long and as broad. *Calyx* lobes 1.4–1.5 mm long, 1.5–1.7 mm broad. *Corolla* tube 4 mm long, lobes 1.2–1.4 mm long, 1.7–2 mm broad. *Anthers* 0.7–1 mm long. *Ovary* 1–1.1 mm high, disc more than half as high as the ovary, usually 0.6 mm high. *Fruit* obversely trapezoid, with thin mesocarp, 7 mm high, 5 mm thick, the tips spreading to 12 mm, the two parts of the hard endocarp contiguous by their bases.

Distribution. Malesia: Sumatra, Java, Lesser Sunda Islands.

SUMATRA. Palembang: Forbes 2851.

JAVA. Bantam: Koorders 144. – Preanger: Junghuhn 114, 122, 123, 140, 196; Koorders 148, 150, 151, 152, 153, 12478; Monterie 3. – Bandung: J.J. Smith 663; Winckel 80, 178. – Banjumas: den Berger s.n. – Kedu: Koorders 27644. – Semarang: Koorders 27643. – Madura: unknown coll. 1818 H.B.; Koorders 12781.

LESSER SUNDA ISLANDS. Lombok: Elbert 1804, 1817. – Sumbawa: Elbert 2832; Kostermans 18697; de Voogd 1612; Zollinger 3322.

Ecology. Lowland rain forest, but higher up than *R. reflexa*, up to 1800 m; also in open places.

Vernacular names. Lameh, lameh utan.

## 7. Rauvolfia reflexa Teijsm. & Binnend.

*R. reflexa* Teijsm. & Binnend., Nat. Tijd. Ned. Ind. 3 (1852) 329; Ned. Kruidk. Arch. 3 (1855) 405; Koord. & Valeton, Bijdr. 1 (1894) 89; Koord., Meded. Lands Pl. Tuin 11 (1894) 81; Atlas 4 (1916) t. 636; K. Schum. in E. & P., Nat. Pfl. Fam. 4, 2 (1895) 154, Boerl., Handl. 2

(1899) 393; Koord.-Schum., Syst. Verz. 1 (1912) 175; Heyne, Nutt. Pl. Ned. Ind. ed. 2 (1927) 1286; Pichon, Bull. Soc. Bot. Fr. 94 (1947) 37; Bakh. f., Blumea 6 (1950) 386; Meijer Drees, Comm. For. Res. Inst. Bogor (1951) 36; Backer & Bakh. f., Fl. Java 2 (1965) 251; Whitm., Mal. For. Rec. 26 (1971) 26; Tree Fl. Mal. 2 (1973) 21. – Type: *Teijsmann s.n.*, anno 1867 (L), Hortus Buitenzorg, Java.

*R. blumeana* Valeton ex Koord.-Schum., Syst. Verz. 1 (1912) 176. – *Cyrtosiphonia reflexa* (Teijsm. & Binnend.) Miq., Fl. Ind. Bat. 2 (1856) 402.

Treelet up to 15 m. *Leaves* 3- to 4-whorled, obovate-elliptic with sinuately tapering base, the uppermost ones 6–9 by 3.5–4 cm, the lower ones oblong-obovate and usually 15 by 6.5 cm, but up to 21 cm long, all shortly acuminate, veins 5–6 mm spaced, petiole 1–1.5(–2.5) cm. Single *inflorescence* loose, with 1 or 2 nodes of dichasia, the whole whorl 5–10 cm long and as broad. *Calyx* lobes 2 mm long, 2.5 mm broad. *Corolla* tube 4 mm long, lobes 1.2–1.3 mm long, 1.4–1.6 mm broad. *Anthers* 0.7–1 mm long. *Ovary* 0.9–1 mm high. Disc more than half as high as the ovary, usually 0.6 mm high. *Fruit* globose, syncarpous, with moderately thick mesocarp, 13 mm diameter, the two parts of the hard endocarp free from each other, erect.

Distribution. Malesia: Java, Lesser Sunda Islands.

JAVA. Peutjang I.: Kostermans et al. 384, 393; Kostermans & Kuswata 21; Kostermans (Unesco) 70; Sinclair 9994: Wirawan 369. – Bantam: Bisset 756, 763, 764a. – Preanger: Koorders 139, 140, 141, 142, 146, 147, 207, 208. – Batavia: Koorders 25660; Schiffner 2423; Winckel 1853. – Nusa Kambangan: Amdjah 141, 181; Koorders 155, 20317, 24755. – Banjumas: Koorders 143, 157, 158, 159, 39001.

LESSER SUNDA ISLANDS. Sumbawa: Elbert 3708, 3760, 3921.

Ecology. Lowland rain forest, even in swampy spots, also wood edges and open places, beach forest on coral; usually below 1000 m.

Vernacular names. Lameh, lameh utan.

Note. According to Whitmore (1973) the peninsular specimens of *R. sumatrana* Jack have been wrongly determined so in former literature and belong to *R. reflexa* Teijsm. & Binnend., whose area he extends far over western Malesia. The type of *R. reflexa* (in L), however, does not favour this interpretation. The group of *R. sumatrana* (species 5–9) is polymorphous and difficult to subdivide. Its most widespread microspecies is *R. sumatrana* s.str., whereas *R. reflexa* is restricted to Java and the Lesser Sunda Islands.

### 8. Rauvolfia samarensis Merr.

*R. samarensis* Merr., Philip. J. Sc. 4 (1900) Bot. 316; En. Philip. Fl. Pl. 3 (1923) 329; Pl. Elm. Born. (1929) 254; Markgr., Bot. Jahrb. 61 (1928) 189; Pichon, Bull. Soc. Bot. Fr. 94 (1947) 37. – Type: *BS 5233*, Samar, Lanang, Philipppines.

Tree up to 18 m. *Leaves* 4- to 5-whorled, broadly elliptic with sinuately tapering base, the uppermost ones 12–20 by 4–8 cm, the lower ones up to 33 cm long and with cuneate base, main lateral veins 5–8 mm spaced, petiole 3–4 cm. Single *inflorescence* thyrsoid, with 2 nodes of trichasia, loose, the whole whorl 12–15 cm high,

15 cm broad. *Calyx* lobes suborbicular, 1.5–1.8 mm long, 1.6–2 mm broad. *Corolla* tube 4–4.5(–4.8) mm long, lobes 1.3–1.7 mm long, 1.6–2 mm broad. *Anthers* 0.7–1.2 mm long. *Ovary* 0.9–1.2 mm high, disc lower than half the ovary, usually 0.4 mm high. *Fruit* globose, with thick mesocarp, 15 mm in diameter (or more?), tapering into a short, cylindric base of 1–2 mm of length, the two parts of the hard endocarp free, erect, parallel.

Distribution. Malesia: Borneo, Celebes, Philippines.

BORNEO. Sabah: (B)NB For. Dep. 36527, 36599; SAN 16885, 33189. – Sandakan: (B)NB For. Dep. 3393, 3442, 9291, 10515, 35377; Hallier 307; SAN A 2565, A 2801, A 2820, A 3985, A 4010, A 4858, 18583, 29783, 30007, 30977, 31383a, 32432, 34926, 73667, 81149.

PHILIPPINES. Luzon: Elmer 15363, 15582; PNH 2802. – Samar: BS 5233. – Bisiran: PNH 21612. – Leyte: BS 41547. – Mindanao: BS 16412; Elmer 11013, 11235, 13302, 13921; PNH 10599.

CELEBES. Elbert 2758; Forster 86; Koorders 16056; de Vriese 13; de Vriese & Teijsmann s.n.

Ecology. Lowland rain forest.

## 9. Rauvolfia sumatrana Jack

*R. sumatrana* Jack, Mal. Misc. 1 (5) (1820) 22; G. Don, Gen. Hist. 4 (1838) 99; DC., Prod. 8 (1844) 337; Hassk., Flora 28 (1845) 263bis (= 295); Miq., Sumatra (1860) 228; Forbes, Wand. (1885) 510; Koord. & Valeton, Bijdr. 1 (1894) 93, Boerl., Handl. 2 (1899) 393; King & Gamble, Mat. Fl. Mal. Pen. 19 (1907) 424, Koord., Exk. Fl. Java 3 (1912) 75; Koord.-Schum., Syst. Verz. 1 (1912) 176; Ridley, Fl. Mal. Pen. 2 (1923) 336; Heyne, Nutt. Pl. Ned. Ind. ed. 2 (1927) 1287; Hend., J. Mal. Br. R. As. Soc. 17 (1939) 57; Kerr in Craib, Fl. Siam. En. 2 (1939) 431; Pichon, Bull. Soc. Bot. Fr. 94 (1947) 37, Burkill, Dict. ed. 2 (1966) 1919; Tsiang Ying & Li Ping Tao, Fl. Reip. Pop. Sin. 63 (1977) 61. – Type: no type of Jack known; neotype proposed by Kew: *Diepenhorst s.n.*, Sumatra, Priaman; first cited by Miquel in 1856.

*R. sumatrana* Jack var. *longifolia* Bl., Bijdr. (1826) 1034; Spanoghe, Linnaea 15 (1841) 325; Hassk., Flora 28 (1845) 263bis (= 295); Miq., Fl. Ind. Bat. 2 (1856) 401; Koord. & Valeton, Bijdr. 1 (1894) 94; Koord., Meded. Lands Pl. Tuin 11 (1894) 81; Boerl., Handl. 2 (1899) 393. – *R. spectabilis* Miq., Sumatra (1860) 228; Boerl., Handl. 2 (1899) 393; Bull. Inst. Bot. Btzg 5 (1900) 12; Merr., En. Born. (1921) 500; Pl. Elm. Born. (1929) 254; Pichon, Bull. Soc. Bot. Fr. 94 (1947) 37; Bakh. f., Blumea 6 (1950) 386, Backer & Bakh. f., Fl. Java 2 (1965) 231. – *R. madurensis* (Teijsm. & Binnend.) Boerl., Handl. 2 (1899) 393; Burck ex Koord.-Schum., Syst. Verz. 1 (1912) 174; Pichon, Bull. Soc. Bot. Fr. 94 (1947) 37. – *R. palawanensis* Elmer, Leafl. Philip. Bot. 4 (1912) 1462; Pichon, Bull. Soc. Bot. Fr. 94 (1947) 37. – *R. reflexa* ex Whitm., Tree Fl. Mal. 2 (1973) 21, auct. non Teijsm. & Binnend.!

*Cyrtosiphonia sumatrana* Miq., Fl. Ind. Bat. 2 (1856) 401. – *Cyrtosiphonia spectabilis* Miq., l.c. 402. – *Cyrtosiphonia madurensis* Teijsm. & Binnend., Cat. Hort. Bog. (1823) 125; Heyne, Nutt. Pl. Ned. Ind. ed. 2 (1927) 1285.

Tree up to 20 m. *Leaves* 3- to 5-whorled, the uppermost ones elliptic-obovate or elliptic-acuminate with sinuately tapering base, 7–15 by 3–4.5 cm, the lower ones up to 26 by 5 cm and often with cuneate base, veins mainly 4–8 mm spaced, petiole 1.5–3 cm. Single *inflorescence* dense, thyrsoid with two nodes of pleiochasia, the whole whorl 8–12 cm high, 12–15 cm diameter. *Calyx* lobes 1.5–1.7 mm long, 1.7–2.2 mm broad. *Corolla* tube 4–4.5 mm long, lobes 1.2–1.7 mm long, 1.4–1.9

mm broad. *Anthers* 0.7–0.9 mm long. *Ovary* 0.8–1 mm high. Disc lower than half the ovary, usually 0.2–0.5 mm high. *Fruit* globose, with thick mesocarp, 15–18 mm high, 18–24 mm broad, often tapering into a 1 mm high cylindric base, the two parts of the hard endocarp free from each other, erect.

Distribution. Malesia: Malay Peninsula (Perak only), Sumatra, Java, Lesser Sunda Islands, Natuna Islands, Borneo, Philippines, Celebes, Talaud Islands, Moluccas, Aru Islands.

MALAY PENINSULA. Perak: Burkill 6280; Kunstler s.n. (cited by Ridley); Scortechini 132n, 1713.

SUMATRA. Eastcoast: Krukoff 4309. – Westcoast: Ahmad 248; Alston 14128a; bb 3011; Diepenhorst s.n.; H.B. 995, Utrecht, Padang (type of *Cyrtosiphonia spectabilis* Miq.); Junghuhn s.n. – South: Forbes 2851, 2860; de Voogd 1096.

JAVA. Bantam: Koorders 160, 161. – Preanger: Koorders 156. – Nusa Kambangan: Murata et al. 541. – Banjumas: Beumée 4846. – Besuki: Koorders 134, 135, 136, 137, 138, 20361.

LESSER SUNDA ISLANDS. Bali: unknown coll. 236. – Sumbawa: Colfs 173; Kuswata 202, 249. – Flores: Schmutz 1313, 1715.

NATUNA ISLANDS. Van Steenis 1241.

BORNEO. Sarawak: Chew Wee Lek 689; S 19120, 34584. – Sabah: (B)NB For. Dep. 9443, 32823, 44652; Clemens 27196; Elmer 21193, 21205; RSNB 2965; SAN 20661, 28988, 30635, 32838, 32931, 33162. – South Kalimantan: Kuswata 985. – East Kutei: Kostermans 4862.

PHILIPPINES. Palawan: Elmer 12591 (type of *R. palawanensis* Merr.). – Samar: PNH 117620. – Mindanao: BS 21387; PNH 37973.

CELEBES. Minahasa: Forman 304; Koorders 16053, 16054, 16057. – Buton I.: Elbert 2647.

TALAUD ISLANDS. H.J. Lam 3124.

MOLUCCAS. Morotai: bb 33722, 33760, 33879; Kostermans 996.

ARU ISLANDS. bb 25403; Buwalda 5244.

Ecology. Lowland rain forest, Dipterocarp and Djati forest (up to 1350 m on Mt Kinabalu in Borneo), also on limestone, wood edges and secondary vegetation.